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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/596,775	06/19/2000	Se Jeong Park	00-415	4403

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EXAMINER	
NGUYEN, HAU H	
ART UNIT	**PAPER NUMBER**
2676	10

DATE MAILED: 01/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/596,775	PARK ET AL.	
	Examiner	Art Unit	
	Hau H Nguyen	2676	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *03* MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 October 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 6 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In claim 6, on line 15, Applicant has claimed "(LOD I to LOD i+3_ storde," which is considered by the examiner as a typographical mistake. Correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-3, 5-6 are rejected under 35 U.S.C. 102(e) as being anticipated by Migdal et al. (U.S. Patent No. 6,417,860).

Referring to claims 1 and 5, Migdal et al. teach a method for providing texture by using clip-map of a texture MIP-map. Texel data relevant to a display image is stored, accessed, and updated efficiently in a clip-map in texture memory, wherein only a clip-map needs to be loaded into a more expensive but quicker texture memory (e.g., DRAM). Two-dimensional or three dimensional texture data can be used (col. 3, lines 9-27). As shown in Fig. 3, Migdal et al. teach

a process for determining which portions of a complete texture MIP-map are to be loaded from mass storage devices 208 into texture memory 226, which acts as a cache, to form a clip-map (col. 7, lines 54-60, and col. 8, lines 4-17). Clip-map 340 essentially consists of a set of tiles, including a pyramidal part (a first DRAM) (LOD[0-M]) and a cubical part (a second DRAM) (LOD[(M+1)- N]). Migdal et al. further teach new texel data for each clip-map tile is read from the mass storage device (an external system memory) and loaded into the texture memory to keep the selected clip-map tiles in line with the shifting eyepoint and field of view (col. 3, lines 44-47) (a sub-clip loader). Migdal et al. also teach a sub-clip predictor as shown in Fig. 5, wherein when the eyepoint X shifts to a new point X' for a new display view, the texel data forming the clip-map 340 must similarly shift to track the new field of view along the axis O'. Portions of the texture MIP-map 330 forming a new "slanted" clip-map 540 are loaded into the texture memory 226 (col. 10, lines 18-24), thus, sub-clips of the tracing direction are prefetched. With reference to Fig. 9, Migdal et al. also teach the texture filter 950 filters texel data sent by the texture memory according to conventional techniques. For example, bi-linear and higher order interpolations (thus, including tri-linear interpolation), blending, smoothing, and texture sharpening techniques can be applied to textures to improve the overall quality of the displayed image (col. 13, lines 55-60). Migdal et al. also teach a check can be made to prevent attempts to draw an image using texel data which is being updated. Fringe regions are defined at the edges of tiles in the cubical part of the clip-map. The fringes include at least those texels being updated. To better accommodate digital addressing, it is preferred that the fringes consist of a multiple of eight texels (col. 11, lines 36-41) (a CAM). Migdal et al. further teach the "clip-map"

process described with respect to FIGS. 8A and 8B, can be carried out through firmware, hardware, software executed by a processor, or any combination thereof (col. 13, lines 13-17).

In regard to claims 2 and 3, Migdal et al. teach the tiles for LOD[1], LOD[2] . . . LOD[4] in the cubical part of a clip-map 440 are only updated when the eyepoint has moved two, four, eight, and sixteen pixels respectively. Because each level of detail in the pyramidal part is already fully included in the tile 415, no updating is necessary in theory (col. 11, lines 16-21).

In regard to claim 6, as shown in Fig. 1A, Migdal et al. teach a set of texture LOD maps having pre-filtered texel data associated with a particular texture. LOD[O] is an 8 X 8 texel array; LOD[1] is a 4 X 4 texel array; LOD[2] is a 2 X 2 texel array; and LOD [3] is a single 1 X 1 texel array. As cited above, with reference to Fig. 5, Migdal et al. teach a texture memory for use as a cache memory for storing clip-map, comprising a sub-clip prediction as shown in Fig. 5, wherein when the eyepoint X shifts to a new point X' for a new display view, the texel data forming the clip-map 340 must similarly shift to track the new field of view along the axis O'. Portions of the texture MIP-map 330 forming a new "slanted" clip-map 540 are loaded into the texture memory 226 (col. 10, lines 18-24), thus, sub-clips of the tracing direction are prefetched. With reference to Fig. 8B, at step 846, Migdal et al. teach when a texel at the appropriate level of detail is not included within a corresponding tile, a coarser substitute texel is accessed. The substitute texel is chosen from the tile at the nearest level of detail which encompasses the originally-sought texel (col. 13, lines 1-6).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Migdal et al. (U.S. Patent No. 6,417,860) in view of Schilling et al. (U.S. Patent No. 6,236,405).

Referring to claim 4, as cited above, Migdal et al. teach a cache memory having a first DRAM banks and a second DRAM banks, and a trilinear interpolator, and accessing multiple of eight texels. Further, the coordinate of texels are defined as integers (col. 15, lines 44-60). Thus, Migdal et al. teach all the limitations of claim 4, except that trilinear interpolation is performed in one clock cycle.

However, Schilling et al. teach a method of texture mapping wherein, as shown in Fig. 8, comprises memory banks 810 (Bank 0, 1, 2, ..., 7), mipmap generation unit 816, tri-linear interpolator 818, and video port 808. Schilling et al. further teach tri-linear interpolation for eight texels is performed in one single access (one clock cycle) (col. 4, lines 9-20).

Therefore, it would have been obvious to one skilled in the art to utilize the method as taught by Schilling et al. in combination with the method as taught by Migdal et al. so that texturing can potentially keep up with fast rasterizer units (col. 4, lines 12-13).

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. See PTO-892 form.

Iglehy et al. ("Prefetching in a Texture Cache Architecture" 1998) teach a texture architecture, which combines prefetching and caching.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hau H. Nguyen whose telephone number is: 703-305-4104. The examiner can normally be reached on MON-FRI from 8:30-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Bella can be reached on 703-308-6829.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D. C. 20231

or faxed to:

(703) 872-9314 (for Technology Center 2600 only)

Hand-delivered response should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA, Sixth floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (703) 306-0377.

H. Nguyen

01/07/2004

Matthew C. Bella

MATTHEW C. BELLA
SUPERVISORY PATENT EXAMINER
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